

# FST34170

## 17-Bit to 34-Bit Multiplexer/Demultiplexer Bus Switch

### General Description

The Fairchild Switch FST34170 is a 17-bit to 34-bit high-speed CMOS TTL-compatible multiplexer/demultiplexer bus switch. The low on resistance of the switch allows inputs to be connected to outputs without adding propagation delay or generating additional ground bounce noise.

The device can be used in applications where two buses need to be addressed simultaneously. The FST34170 is designed so that the A Port demultiplexes into B<sub>1</sub> or B<sub>2</sub> or both.

Two select (SEL<sub>1</sub>, SEL<sub>2</sub>) inputs provide switch enable control.

### Features

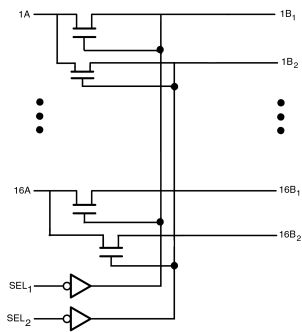
- Slower Output Enable times prevent signal disruption
- 4Ω switch connection between two ports.
- Minimal propagation delay through the switch.
- Low I<sub>CC</sub>.
- Zero bounce in flow-through mode.
- Control inputs compatible with TTL level.
- See Applications Note AN-5008 for details

### Ordering Code:

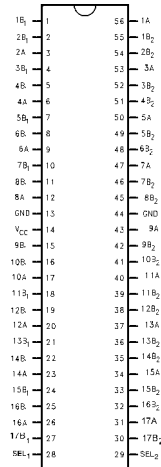
Order Number	Package Number	Package Description
FST34170MTD	MTD56	56-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 6.1mm Wide

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

### Logic Diagram



### Connection Diagram



### Truth Table

Inputs		Function
SEL <sub>1</sub>	SEL <sub>2</sub>	
L	H	x A = x B <sub>1</sub>
H	L	x A = x B <sub>2</sub>
L	L	x A = x B <sub>1</sub> and x B <sub>2</sub>
H	H	Switch Open

### Pin Descriptions

Pin Name	Description
SEL <sub>1</sub> , SEL <sub>2</sub>	Select Inputs
A	Bus A
B <sub>1</sub> , B <sub>2</sub>	Bus B

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**Absolute Maximum Ratings** (Note 1)

Supply Voltage ( $V_{CC}$ )	-0.5V to +7.0V
DC Switch Voltage ( $V_S$ ) (Note 2)	-0.5V to +7.0V
DC Input Control Pin Voltage ( $V_{IN}$ ) (Note 3)	-0.5V to +7.0V
DC Input Diode Current ( $I_{IK}$ ) $V_{IN} < 0V$	-50 mA
DC Output Current ( $I_{OUT}$ )	128 mA
DC $V_{CC}/GND$ Current ( $I_{CC}/I_{GND}$ )	+/- 100 mA
Storage Temperature Range ( $T_{STG}$ )	-65°C to +150 °C

**Recommended Operating Conditions** (Note 4)

Power Supply Operating ( $V_{CC}$ )	4.0V to 5.5V
Input Voltage ( $V_{IN}$ )	0V to 5.5V
Output Voltage ( $V_{OUT}$ )	0V to 5.5V
Input Rise and Fall Time ( $t_r, t_f$ )	
Switch Control Input	0nS/V to 5nS/V
Switch I/O	0nS/V to DC
Free Air Operating Temperature ( $T_A$ )	-40 °C to +85 °C

**Note 1:** The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum rating. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

**Note 2:**  $V_S$  is the voltage observed/applied at either the A or B Ports across the switch.

**Note 3:** The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.

**Note 4:** Unused control inputs must be held HIGH or LOW. They may not float.

**DC Electrical Characteristics**

Symbol	Parameter	$V_{CC}$ (V)	$T_A = -40\text{ °C to }+85\text{ °C}$			Units	Conditions
			Min	Typ (Note 5)	Max		
$V_{IK}$	Clamp Diode Voltage	4.5			-1.2	V	$I_{IN} = -18\text{mA}$
$V_{IH}$	HIGH Level Input Voltage	4.0-5.5	2.0			V	
$V_{IL}$	LOW Level Input Voltage	4.0-5.5			0.8	V	
$I_I$	Input Leakage Current	5.5			$\pm 1.0$	$\mu\text{A}$	$0 \leq V_{IN} \leq 5.5V$
		0			10	$\mu\text{A}$	$V_{IN} = 5.5V$
$I_{OZH}, I_{OZL}$	OFF-STATE Leakage Current	5.5			$\pm 1.0$	$\mu\text{A}$	$0 \leq A, \leq V_{CC}, V$
		5.5			$\pm 1.0$	$\mu\text{A}$	$0 \leq B, \leq V_{CC}, V$
$R_{ON}$	Switch On Resistance (Note 6)	4.5		4	7	$\Omega$	$V_{IN} = 0V, I_{IN} = 64\text{ mA}$
		4.5		4	7	$\Omega$	$V_{IN} = 0V, I_{IN} = 30\text{ mA}$
		4.5		8	14	$\Omega$	$V_{IN} = 2.4V, I_{IN} = 15\text{ mA}$
		4.0		11	20	$\Omega$	$V_{IN} = 2.4V, I_{IN} = 15\text{ mA}$
$I_{CC}$	Quiescent Supply Current	5.5			3	$\mu\text{A}$	$V_{IN} = V_{CC}$ or GND, $I_{OUT} = 0$
$\Delta I_{CC}$	Increase in $I_{CC}$ per Input	5.5			2.5	mA	One input at 3.4V Other inputs at $V_{CC}$ or GND

**Note 5:** Typical values are at  $V_{CC} = 5.0V$  and  $T_A = +25\text{ °C}$

**Note 6:** Measured by the voltage drop between A and B pins at the indicated current through the switch. On resistance is determined by the lower of the voltages on the two (A or B) pins.

## AC Electrical Characteristics

Symbol	Parameter	$T_A = -40\text{ }^\circ\text{C to } +85\text{ }^\circ\text{C},$ $C_L = 50\text{ pF}, R_U = R_D = 500\Omega$				Units	Conditions	Figure No.
		$V_{CC} = 4.5 - 5.5\text{V}$		$V_{CC} = 4.0\text{V}$				
		Min	Max	Min	Max			
$t_{PHL}, t_{PLH}$	A or B, to B or A (Note 7)		0.25		0.25	ns	$V_I = \text{OPEN}$	Figures 1, 2
$t_{PZH}$	Output Enable Time, SEL to A, B	7.0	30.0		35.0	ns	$V_I = \text{OPEN}$ for $t_{PZH}$	Figures 1, 2
$t_{PZL}$	Output Enable Time, SEL to A, B	7.0	30.0		35.0	ns	$V_I = 7\text{V}$ for $t_{PZL}$	Figures 1, 2
$t_{PHZ}$	Output Disable Time, SEL to A, B	1.0	6.9		7.3	ns	$V_I = \text{OPEN}$ for $t_{PHZ}$	Figures 1, 2
$t_{PLZ}$	Output Disable Time, SEL to A, B	1.0	7.7		7.7	ns	$V_I = 7\text{V}$ for $t_{PLZ}$	Figures 1, 2

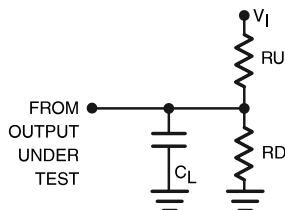
**Note 7:** This parameter is guaranteed by design but is not tested. The bus switch contributes no propagation delay other than the RC delay of the typical On resistance of the switch and the 50pF load capacitance, when driven by an ideal voltage source (zero output impedance).

## Capacitance (Note 8)

Symbol	Parameter	Typ	Max	Units	Conditions
$C_{IN}$	Control pin Input Capacitance	4		pF	$V_{CC} = 5.0\text{V}$
$C_{I/O\ OFF}$	Input/Output Capacitance "OFF State"	8		pF	$V_{CC} = 5.0\text{V}, \text{Switch OFF}$

**Note 8:**  $T_A = +25\text{ }^\circ\text{C}, f = 1\text{ MHz}$ , Capacitance is characterized but not tested.

## AC Loading and Waveforms



**Note:** Input driven by 50Ω source terminated in 50Ω

**Note:**  $C_L$  includes load and stray capacitance,  $C_L = 50\text{ pF}$

**Note:** Input PRR = 1.0 MHz,  $t_W = 500\text{ ns}$

FIGURE 1. AC Test Circuit

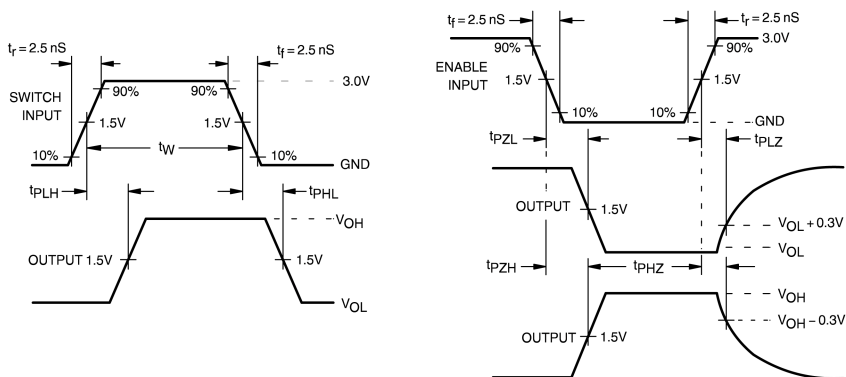
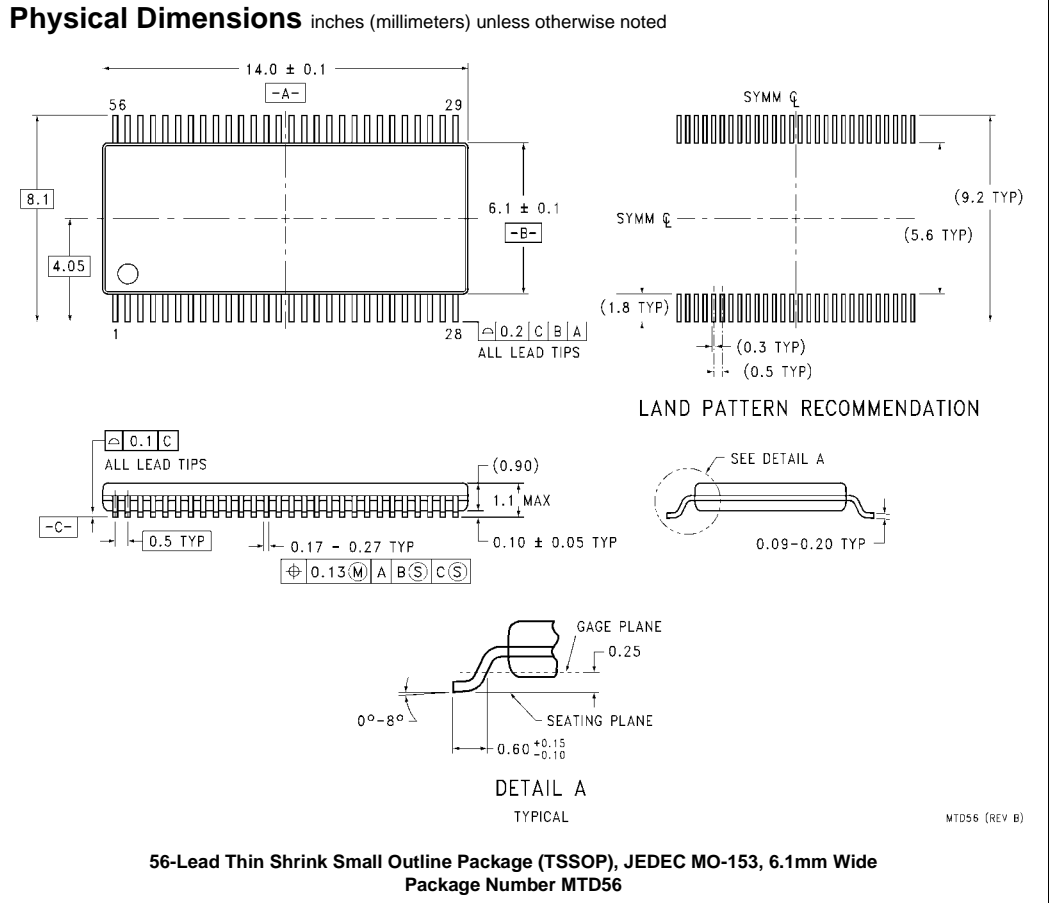


FIGURE 2. AC Waveforms



### Technology Description

The Fairchild Switch family derives from and embodies Fairchild's proven switch technology used for several years in its 74LVX3L384 (FST3384) bus switch product.

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